Implementing Systems Engineering: DoD Guidance for Systems Engineering Plans

Col (sel) Warren M. Anderson
Systems Engineering, Enterprise Development
Office of the Under Secretary of Defense (AT&L)

Importance and Criticality of SEP

- THE primary mechanism for SE revitalization
- Overarching, integrating technical plan for program's implementation of systems engineering best practice (and all that entails)
  - Scope and role of Technical Authority, process implementation, technical baseline management, technical reviews, technical risk assessment, independent peer review implementation, etc
- A living document
  - Should contain evidence of use, application, and updating

Drive SE back into acquisition programs

Systems Engineering Plan Preparation Guide, V0.90

SEP Preparation Guide (Version 0.90) Outline

- Program description, technical status, and approach for updating the SEP
- SE application to life cycle phases
  - System capabilities, requirements, and design considerations
  - SE organizational integration
  - SE Process
  - Technical baseline implementation and control and technical reviews planned
  - SEP linkage with other programmatic management efforts

Introduction

- Program Description and Applicable Documents
- Program Technical Status as of Date of the SEP
- Approach for SEP Updates

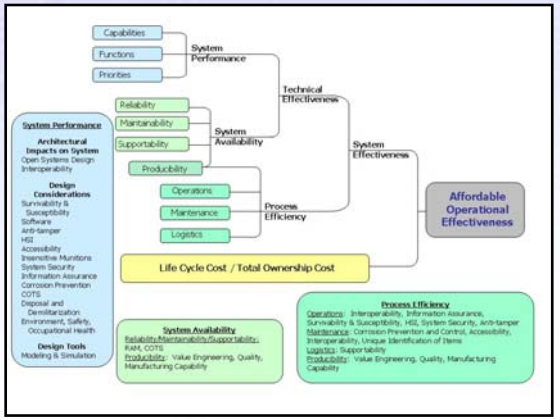
Should answer a series of key questions

What are the technical issues?

- Capability required and operational concept(s), referencing the appropriate JCIDS documents
- Key Performance Parameters (KPPs) and the rationale and basis for the KPPs
- Certification Requirements
- Design Considerations

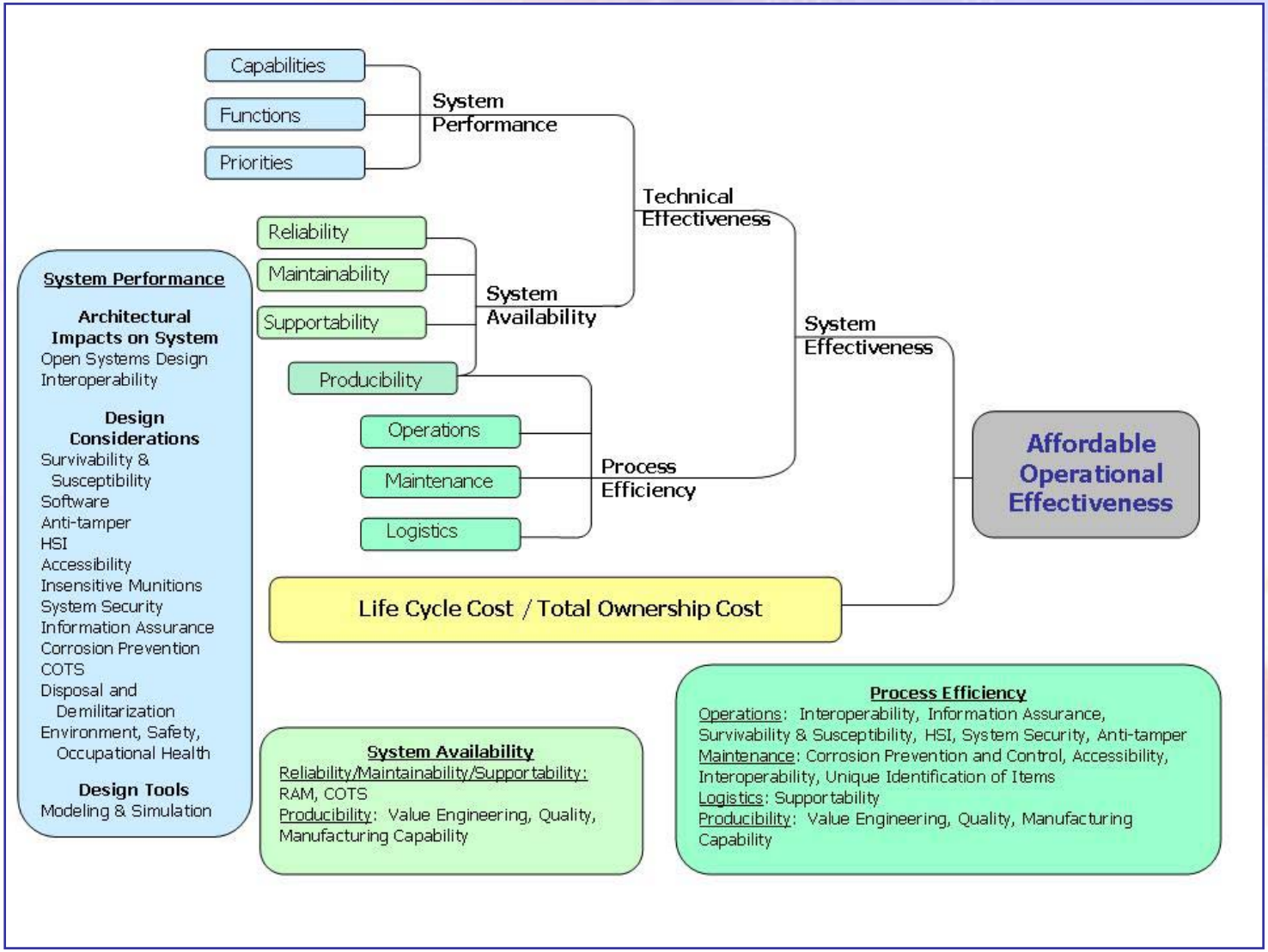
Important Design Considerations

- SE must manage all requirements as an integrated set of design constraints
  - KPPs
  - Statutory
  - Regulatory
  - Derived performance requirements



- Decomposition and allocation must address entire set at each level of recursion
- Integrated set of requirements and associated stakeholders are a primary driver for program staffing (non-trivial)

Important Design Considerations
"The Fishbone"

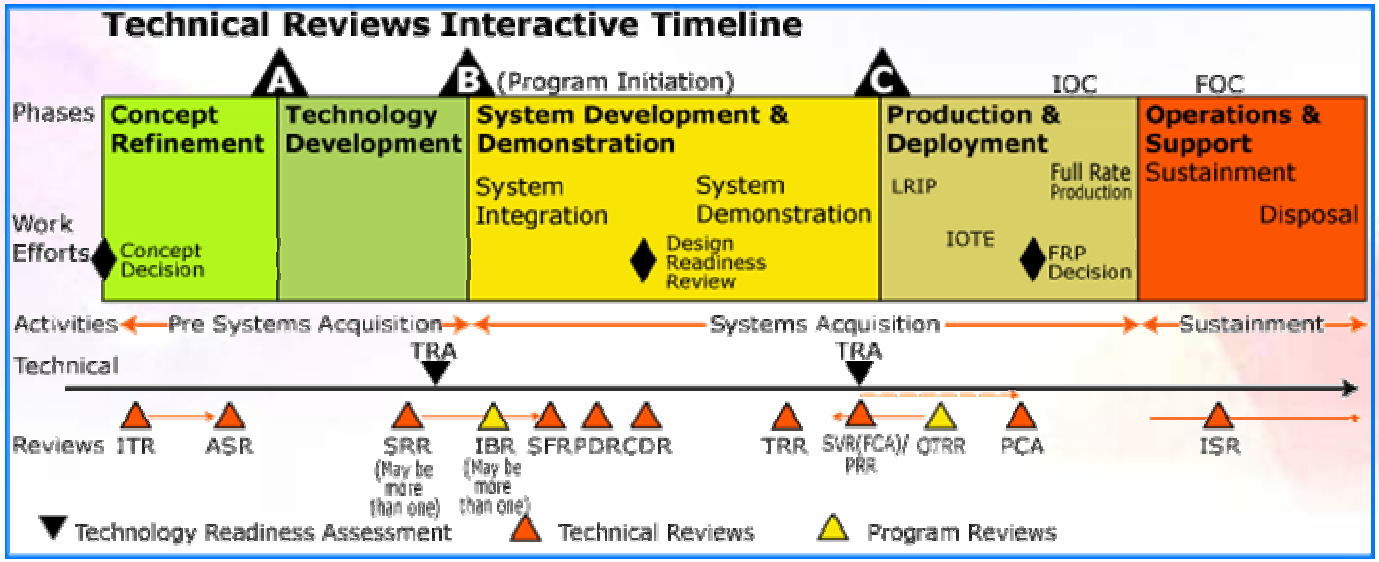


Who has responsibility and authority for managing the technical issues?

- The overall organization of the systems engineering effort, including delineation of authorities, responsibilities, and integration across the government and contractor boundaries from prime contractor down to the lowest level supplier
- The authorities and role of the chief or lead systems engineer and systems engineering teams
- The staffing levels, training, and experience needed to execute the required systems engineering effort
- How the systems engineering structure is organized to provide technical management guidance across the government, prime contractor, subcontractors, and suppliers
- How technical authority will be implemented on the program to address the full spectrum of program requirements
- For family-of-systems and system-of-systems efforts, how the program-level systems engineering efforts are integrated with higher-level systems engineering authorities

What processes and tools will be used to address the technical issues?

- Broad in scope and as comprehensive as the program's maturity allows, describing the top-level SE process application for the system's upcoming life-cycle phase



Approach for Trades

- Implementation and approach for trade studies:
  - Who is responsible for making trade-off decisions and at what level in the organization does that decision maker reside
  - What studies have been and will be conducted, who did or will conduct them, how they were or are to be conducted to include a discussion of trades as part of a family-of-systems or system-of-systems solution
  - Approach for progressing through the typical systems engineering steps: requirements analysis, decomposition, allocation, and analysis
  - Summary of prior trade studies and how they have steered the technical and programmatic changes to the program

How will that process be managed and controlled?

- Technical Management and Baseline Control
  - Who has the responsibility
  - How specifications and baselines will be managed and controlled
  - Identifies by name the specification documents that require development and those which currently exist as legacy requirements and specifications

How will that process be managed and controlled?

- Technical Reviews Approach and Strategy
  - Technical review membership composition, including method for nominating and approving chairperson and membership
  - Roles and responsibilities of those involved
  - Procedures used in conducting reviews
  - Number of technical reviews planned and to what WBS-level
  - Entry and exit criteria for each review
  - Timing of each review
  - How technical reviews are used to manage the technical effort

How is that technical effort linked to the overall management of the program?

- Relationship and feedback mechanisms between the SE technical and key program management processes:
  - Acquisition strategy
  - Risk management
  - Earned value management system
  - Contract management

SEP Coordination and Approval

- For ACAT ID or IAM:
  - SEP forwarded by CAE to MDA NLT 30 days before DAB or subsequent program initiation if PM needs OSD-approved document before the decision date
  - Defense Systems (DS) Program Support Team lead:
    - Coordinates inside DS (SE, SMI, and SA), as appropriate
    - Forwards to appropriate OIPT leader for approval: Director, DS, or Acting Deputy, ASD (NII) C3ISR & IT Acquisition
- For non-ACAT ID or IAM, SEP approved by component MDA or designated SEP approval authority

Systems Engineering Plan

- Will reside on DS/SE website with links to appropriate guidance in *Defense Acquisition Guidebook*
- Will engage with programs currently developing their SEP
- Will continue collecting feedback to revise and update Guide

http://www.acq.osd.mil/ds/se/publications.htm

Summary

- SEP is the instrument to drive effective SE back into programs
  - Agreement on scope of SE—early and persistent SE applied throughout the program's life cycle
  - Common understanding of how SE is implemented on programs

Systems Engineering for Mission Success